1.116

RESPONSE UNDER 37 CFR

PROCEDURE

EXPEDITED EXAMINING

ART UNIT

3752

Status of the Claims

1. – 42. Canceled.

43. (Previously Presented) An apparatus comprising an atomizer, wherein said atomizer comprises a body portion, wherein said body portion comprises:

a gas aperture;

an annular gas cavity, wherein said gas cavity receives a flow of gas from said gas aperture;

an annular gas nozzle, wherein said gas nozzle receives said flow of gas from said gas cavity, wherein:

a bulk of said flow of gas flows in a radial direction through said gas aperture; and

a bulk of said flow of gas flows in an axial direction through said gas nozzle.

44. (Original) The apparatus of claim 43 wherein said atomizer comprises a resonator, wherein said resonator is spaced apart from said gas nozzle.

45. (Original) The apparatus of claim 43 wherein said body portion comprises:

a liquid inlet, wherein said liquid inlet is disposed at a marginal region of said body portion;

an annular liquid cavity, wherein said liquid cavity receives a flow of liquid from said liquid inlet; and

an liquid outlet, wherein said liquid outlet receives said flow of liquid from said annular liquid cavity.

46. (Previously Presented) The apparatus of claim 45 wherein said liquid outlet delivers said flow of liquid to an atomization region that is disposed proximal to said gas nozzle.

47. – 61. Canceled.

62. (Previously Presented) The apparatus of claim 43, wherein said atomizer consists essentially of three parts, wherein said three parts are:

a casing, wherein said casing has an axially-disposed opening for receiving said flow of gas;

a central core, wherein a portion of said central core is received by said opening in said casing, and wherein said gas cavity and said gas nozzle are defined in a space between said casing and said central core; and

a cowling, a portion of said cowling abuts a portion of an outer surface of said casing, wherein said body portion comprises said casing, said cowling, and an upper portion of said central core.

63. (Previously Presented) The apparatus of claim 62 wherein an annular liquid cavity and a liquid outlet channel are defined by a surface of said cowling and a groove in said casing.

64. (Previously Presented) The apparatus of claim 62 wherein said gas aperture defines a hole through said central core, thereby fluidically coupling said axially-disposed opening in said casing with said gas cavity.

65. (Previously Presented) The apparatus of claim 62 wherein said gas aperture is substantially perpendicular to said axially-disposed opening in said casing.

66. (Previously Presented) The apparatus of claim 62 further comprising a resonator, wherein said resonator is defined by an annular channel in a lower portion of said central core, wherein said annular channel is spaced apart from and disposed in opposition to said gas nozzle.

67. (Previously Presented) The apparatus of claim 44 wherein said resonator is dimensioned and arranged to provide a frequency of oscillation that is in a range of about 16 kHz to about 20 kHz.

68. (Previously Presented) The apparatus of claim 43 wherein said gas nozzle has a conicity angle that is within a range of about 50 to about 80 degrees.

69. (Previously Presented) The apparatus of claim 43 wherein a compression factor across said gas nozzle is in a range of about 5 to about 50.

70. (Previously Presented) The apparatus of claim 45 wherein said gas comprises a mixture that is non-toxic.

71. (Previously Presented) The apparatus of claim 45 wherein said gas comprises nitrogen and carbon dioxide.

72. (Previously Presented) The apparatus of claim 43 wherein a pressure of said gas at an inlet to said atomizer is in a range of about 25 to about 55 psig.

73. (Previously Presented) The apparatus of claim 43 wherein a pressure of said gas at said gas nozzle is in a range of about 21 psig to about 52 psig.

74. (Previously Presented) The apparatus of claim 43 wherein said apparatus is a system for fire suppression, and wherein said liquid is water and said gas comprises nitrogen, and further wherein said system comprises:

a first conduit for coupling said atomizer to a supply of said liquid;

a second conduit for coupling said atomizer to a supply of said gas; and

a detection device for detecting a condition indicative of fire.

75. (Previously Presented) An apparatus comprising an atomizer, wherein said atomizer comprises:

a gas inlet for receiving a flow of gas;

a plurality of gas apertures, wherein said gas aperture are in fluidic communication with said gas inlet;

a gas cavity, wherein said gas cavity is in fluidic communication with said gas apertures; and

a gas nozzle, wherein said gas nozzle is in fluidic communication with said gas cavity, and wherein a compression factor across said gas nozzle is in a range of about 5 to about 50, and further wherein a conicity angle of said gas nozzle is in a range of about 50 to about 80 degrees.

76. (Previously Presented) The apparatus of claim 75, further comprising a liquid inlet, wherein said liquid inlet receives a flow of liquid.

77. (Previously Presented) The apparatus of claim 76, further comprising a liquid outlet, wherein said gas and said liquid do not come into contact with each until said liquid passes through said liquid outlet and said gas passes through said gas nozzle.

78. (Previously Presented) The apparatus of claim 77 wherein a pressure of said gas is sufficient so that when said flow of gas exits said gas nozzle, a velocity of said flow of gas is supersonic.

79. (Previously Presented) The apparatus of claim 78 further comprising a surface for braking said supersonic flow of gas.

80. (Previously Presented) The apparatus of claim 79 wherein said surface for braking is configured to function as a resonator, wherein said surface for braking is spaced apart and disposed in opposition to said gas nozzle, and wherein atomization of said liquid occurs in a region between said gas nozzle and said resonator.

81. (Previously Presented) The apparatus of claim 75 wherein said gas nozzle is defined by narrowing a width of said gas cavity.

82. (Previously Presented) The apparatus of claim 76, further comprising a liquid outlet, wherein said gas and said liquid do not come into contact with each other until said flow of gas is accelerated to supersonic velocity.

83. (Previously Presented) The apparatus of claim 76, wherein said liquid outlet comprises a plurality of grooves, not a continuous annular region.

84. (Previously Presented) The apparatus of claim 75 wherein said gas inlet, said gas apertures, and said gas nozzle are physically configured so that:

said flow of gas through said gas nozzle is substantially parallel to said flow of gas into said gas inlet, and

said flow of gas through said gas apertures is substantially orthogonal to said flow of gas into said gas inlet and through said gas nozzle.

85. (Previously Presented) The apparatus of claim 75 wherein said gas apertures are configured to deliver said gas to an upper portion of said gas cavity.

86. (Previously Presented) The apparatus of claim 75 wherein said gas flows in a first direction as it enters said gas cavity and said gas flows in a second direction as it leaves said gas cavity, wherein said first direction is substantially different from said second direction.

87. (Previously Presented) The apparatus of claim 86 wherein said first direction is substantially perpendicular to said second direction.

88. (Previously Presented) The apparatus of claim 76 wherein said gas is non-toxic and comprises a mixture of nitrogen and carbon dioxide.

89. (Previously Presented) An apparatus comprising an atomizer, wherein said atomizer comprises a body portion, wherein said body portion comprises:

a liquid inlet for receiving a flow of liquid;

a gas inlet for receiving a flow of gas;

means for introducing instability in said flow of said gas;

a gas nozzle through which said flow of gas exits said body portion; and

a resonator, wherein said resonator is spaced apart from said body portion and is disposed in opposition to said gas nozzle, and wherein:

(1) a compression factor across said nozzle is in a range of about 5 to about 50; and

(2) a conicity angle of said nozzle is in a range of about 50 to about 80 degrees.

90. (Previously Presented) The apparatus of claim 89 wherein said compression factor across said gas nozzle is within a range of about 5 to about 30.

91. (Previously Presented) The apparatus of claim 89 wherein said flow of liquid and said flow of gas do not contact each other until said flows exit said body portion of said atomizer.

92. (Previously Presented) The apparatus of claim 89, wherein said atomizer comprises:

a casing, wherein said casing has an axially-disposed opening;

a central core, wherein a portion of said central core is received by said opening in said casing, and wherein a gas cavity and said gas nozzle are defined in a space between said casing and said central core; and

a cowling, a portion of said cowling abuts a portion of an outer surface of said casing, wherein:

(1) said body portion comprises said casing, said cowling, and an upper portion of said central core; and

(2) said means for introducing instability comprises said gas cavity.

93. (Previously Presented) The apparatus of claim 89, wherein a jet curvature parameter is within a range of about 0.8 to about 0.9, wherein said jet curvature parameter is obtained by dividing an outer diameter of said central core by a diameter of said gas nozzle.